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Original Article

Evaluation of the Raphanus sativus effect on urinary pH

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Abstract

BACKGROUND: According to urology texts, urinary calculi are the third most common affliction of the urinary tract and they pose great expenses on health services. The use of oral herbal medication is one of the cheapest ways of treating this disease (in some societies black radish plant is used as a treatment). The scientific term for black radish is Raphanus sativus nigra. Urinary pH is a prominent factor in any crystallization process in urine. This study was conducted to determine the possible effects of Raphanus on urinary pH as a factor in stone formation and crystallization.

METHODS: Thirty healthy people including 11 males and 19 females without any history of drug consumption or urinary calculi in their first degree relatives were chosen and underwent a four days trial. The experiment included 2 days of Raphanus juice consumption during which urinary pH was measured 4 times a day. The averages of Urinary pH with or without Raphanus juice consumption were compared by t-paired test.

RESULTS: The Study was carried out using 30 participants including 11 males and 19 females with the mean ± SD age of 28.66 ± 10.8 (range 19-55). Out of the eight pairs of urinary pH, only in two pairs P values were 0.05 and 0.028 and the rest were all greater than 0.05 which is not sufficient to show a significant difference between urinary pH with or without Raphanus juice consumption.

CONCLUSIONS: In this study, the effect of Raphanus sativus nigra on urinary pH was not proved. However, according to the proved effects of Raphanus as a diuretic and dissolution agent in Rats, it would be reasonable to repeat the same study in a human population.

KEY WORDS: Raphanus sativus, urinary pH, urinary calculus**.**

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Urinary calculi are the third most common affliction of the urinary tract which are exceeded by the urinary tract infections and prostate diseases. The prevalence is about 2-3 percents of the population. Until 1980, urinary stone disease was a great challenge and many patients underwent major open surgeries to be cured [1]. There are several methods for treatment of urinary stones: conservative observation, dissolution agents, extra corporeal shock wave lithotripsy (ESWL), transurethral lithotripsy (TUL), percutaneous nephrolithotomy (PNL) and open surgery [2-5]. Depending on the stone composition, several fluids have been found to be suitable for the prevention and treatment of urinary stones: mineral water, orange juice, apple juice and herbal teas [6]. Honow et al (2003) identified a significant increase in urine pH after orange juice consumption [6]. Kessler et al (2002) has found that blackcurrant juice, because of its alkalizing effect, can support the treatment of uric acid stone disease. In addition, he has indicated that cranberry juice acidifies urine and is useful in the treatment of brushite and struvite stones as well as urinary

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tract infection [7]. This study has focused on an oral medication, black radish. The scientific term for black radish is Raphanus sativus nigra and it is a member of cruciferae family. Raphanus had been accepted as a dissolution agent and diuretic for the treatment and the prevention of urinary stones in the old days of medicine [8-10]. In a study in Mexico which was done in 1999, the effects of Raphanus were evaluated among rats [11]. The study showed a decrease in urinary calculi weights and an increase in 24-hour urine volumes in comparison with control group [11]. We supposed some of the reported beneficial effects of Raphanus are perhaps because of its possible effect on urinary pH. Therefore, we limited our study to Raphanus effect on urinary pH as a factor in crystallization and urinary ions solubility.

Methods

In this clinical trial which was done in 2003 in Isfahan, Iran, 30 healthy people aged 18-55 years were selected. The subjects had no specific disease, they were not on any specific drug, and they were not on any special diet. None of their first-degree relatives had a history of urinary stones. In this experiment, urinary pH was measured by pH meter papers for four days. In the first 2days no Raphanus juice was given to the subjects. In the second 2 days, participants consumed Raphanus juice. We measured the pH during the first and second days to make sure that we did not miss the possible effect of Raphanus on urinary pH. In the second period, the Raphanus juice was given 3 times: the night before the first day, the first day after breakfast and the first day after lunch. The juice was prepared for every dose by adding 100 cc of water to 30 cc of fresh Raphanus juice. Because we found no previous studies in this field, we chose this amount of juice just as a point to start. Raphanus juice was made by a juicer at home. All the subjects received a diet guideline (just to recommend them to use no specific drug and not to be on any special diet), a form to record pH values and possible adverse effects, and pH strips from MADAUS Company. Then the urinary pH was measured four times a day immediately after voiding. To observe the effect of last night juice, urinary pH was checked before breakfast. Also, to evaluate the effect of post breakfast juice, pH was checked 2 hours after breakfast and before lunch. Finally, to observe the effect of post lunch juice, pH was checked in the afternoon. The data recorded in forms were analyzed using t-paired test at a significant level of $P<0.05$.

Results

The study was carried out using 30 participants including 11 males and 19 females with the mean ± SD age of 28.66 ± 10.8 years (range of 19-55). No adverse effect was reported by the participants. The averages of pH are shown in table 1 in the eight pairs. Only in the first and the sixth pH pairs (before breakfast at the first day and before lunch at the second day), P value was less than 0.05. Therefore, out of the eight pH pairs only in two pH pairs, there was significant difference which is not sufficient to prove Raphanus juice efficacy on urinary pH.

Discussion

Many studies have taken place to evaluate the effects of different beverages on urine composition and parameters. Embil et al (1967) evaluated the effects of two regimes of orange juice on pH. The regime of 1500 ml which was divided into five 300-ml portions a day could significantly alter the urine pH while another regime including 300 ml once in the morning did not change it [12]. Kessler et al (2002) evaluated the influence of blackcurrant, cranberry and plum juice consumption on stone formation risk factors using 12 healthy male subjects. In his study, cranberry juice decreased the urine pH, whereas it increased the excretion of oxalic acid. Black currant juice increased urinary pH and also increased the excretion of citric and oxalic acid [7]. Honow et al (2003) studied nine healthy female subjects to evaluate the effects of grape fruit, apple and orange juice on urinary variables. The study indicated a significant alkalizing effect on urine pH for grapefruit but, orange and apple juice had no

Table 1. Comparison between urinary pH averages before and after Raphanus juice consumption (SD = standard deviation).

Time		pH average	pH S.D	t-paired test Results t-value	p-value
Before breakfast In the first day	Before Raphanus consumption After Raphanus consumption	6.19 5.84	0.61 0.49	3.05	0.005
Before breakfast In the second day	Before Raphanus consumption After Raphanus consumption	5.85 5.89	0.49 0.65	-0.303	0.764
2 hours after breakfast In the first day	Before Raphanus consumption After Raphanus consumption	5.98 6.06	0.55 0.55	-0.760	0.453
2 hours after breakfast In the second day	Before Raphanus consumption After Raphanus consumption	5.98 5.99	0.51 0.53	-0.088	0.930
Before lunch In the first day	Before Raphanus consumption After Raphanus consumption	6.08 6.10	0.47 0.60	-0.242	0.810
Before lunch In the second day	Before Raphanus consumption After Raphanus consumption	6.02 6.32	0.54 0.65	-2.311	0.028
In the first day afternoon	Before Raphanus consumption After Raphanus consumption	6.47 6.35	0.72 0.68	0.743	0.463
In the Second day afternoon	Before Raphanus consumption After Raphanus consumption	6.46 6.62	0.60 0.57	-0.0564	0.129

effects on urine pH [6]. In a study by Vargas et al (1999), the aqueous extract of the bark of Raphanus sativus was tested for its antiurolithiatic and diuretic activities. Urolithiasis was experimentally induced by the implantation of zinc disc in the urinary bladder of rats. Significant decrease in the weight of stones was observed after the treatment in the animals that received aqueous extract in comparison with control groups. This extract showed an increase in the 24 h urine volume as compared to the control. They supposed that the antiurolithiatic effect of Raphanus is perhaps because of its diuretic effect [11]. We believe some of the antiurolithiatic effects of Raphanus are due to its possible effect on urinary pH. In this study we could not prove Raphanus juice efficacy on urinary pH. However, according to the previous studies about the effects of Raphanus on diuresis and reducing urinary stone size (on Rats), it is recommended to study more about the Raphanus plant's preventive effects on other aspects of urinary stone formation and crystallization. Because the use of Raphanus plant is cost effective, it would be reasonable to evaluate the curative effects of this plant on the patients with urinary stone disease. Further studies about the Raphanus juice effects on the 24-hour urine volume and on the weight of passed urinary stones among human beings (as the study among rats) will be helpful.

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